APPENDIX T

THE COMPARISON OF FIELD DATA AND PREDICTED RESULTS

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This appendix shows comparison examples between the observed reflection crack extent and severity for all the different types of overlay-pavement structure-climatic zone combinations that were developed in this project from the field survey and the predicted result from the reflection cracking prediction program. The field information used to determine the crack growth condition was mainly collected from the LTPP (Long Term Pavement Performance) database.

The first set of cases illustrates different AC overlays over different existing pavement structures in a wet-freeze climate zone. An AC overlay over an existing AC pavement structure is illustrated in Figure T-1. The result of comparing the observed and predicted LMH severity distress shows that the prediction program predicts the crack growth behavior for the early stage very well. After 7 years, it shows a slight difference between the field and the predicted result. Figures T-2 and T-3 show the LMH and MH severity distresses, respectively, for an AC overlay over an existing JCP structure in a wet-freeze climate zone. For the field data in the LMH case, the crack growth appeared in the 3rd year and the rate of the crack growth was lower than the predicted results. However, the predicted results show that the crack growth increases slightly in the 3rd year, followed by a sharp increase in the rate of the crack growth after that. The MH case in Figure T-3 shows good correlation between the field and predicted rates of crack growth. The results of the LMH and MH severity distresses for an AC overlay over an FC (SC) pavement structure in a wet-freeze climate zone are shown in Figures T-4 and T-5, respectively. Figure T-4 illustrates how the prediction program simulates the early stage of crack growth; however, the predicted results have a higher rate of crack growth than the field data. Conversely, the results in the case of MH severity distress, Figure T-5, show that the predicted results have a lower rate of crack growth than the field data; however, the predicted and observed rates of crack growth are close. Figures T-6 and T-7 show the comparison of LMH and MH severity levels, respectively, for an AC overlay over an existing CRCP structure in a wet-freeze climate zone. In this case, the predicted and field survey results for both the LMH and MH severity levels are very close. The next case is located in New York City and is an AC overlay over a reinforcing interlayer over a PCC pavement structure in a wet-freeze climate zone. The results for the LMH and MH severity distresses are shown in Figures T-8 and T-9, respectively. The prediction program accurately simulated the field crack growth behavior for the LMH severity level as shown in Figure T-8. For the MH severity level, in Figure T-9, the prediction program predicts a higher rate of crack growth than those observed in the field.

The second set of cases illustrates different AC overlays over different existing pavement structures in a wet-no freeze climate zone. The LMH and MH severity distresses for an AC overlay over an existing AC pavement structure in a wet-no freeze climate zone are shown in Figures T-10 and T-11. The prediction program predicted LMH severity distress around 6 percent greater than the field survey data. The MH severity distress prediction shown in Figure T-11 is close to the field survey data. The next two cases, displayed in Figures T-12 and T-13, are an AC overlay over an existing FC pavement structure and an AC overlay over a reinforcing interlayer over an existing PCC pavement structure in a wet-no freeze climate zone. These two cases show good predictions compared with the field data.

The third set of cases illustrates different AC overlays over different existing pavement structures in a dry-freeze climate zone. Figures T-14, T-15, and T-16 display the results of LMH, MH, and H severity distresses, respectively, for an AC overlay over an existing AC pavement structure in a dry-freeze climate zone. There is good correlation between the predicted and observed field survey data in both the LMH and MH severity levels in Figure T-14 and Figure T-15. In the H severity distress prediction in Figure T-16, the field survey recorded that there was no high severity cracking observed within the first seven years, and then a 33 percent crack length occurred in the 8^{th} year. The prediction program predicted no crack growth for the first seven years, but in the 8^{th} year, the percentage of crack growth was predicted to increase only to 6 percent. An AC overlay over a reinforcing interlayer over an existing AC pavement structure in a dry-freeze climate zone is shown in Figure T-17. The slope of the crack growth is the same for both the field and the predicted results; however, the percentage of the predicted crack length is smaller than the field data by around 3 percent.

The final set of cases illustrates different AC overlays over different existing pavement structures in a dry-no freeze climate zone. Figures T-18 and T-19 show the LMH and MH severity distresses respectively. In both figures show that after 7 years, there are some differences between the field and the predicted results, but the differences are less than 5 percent.

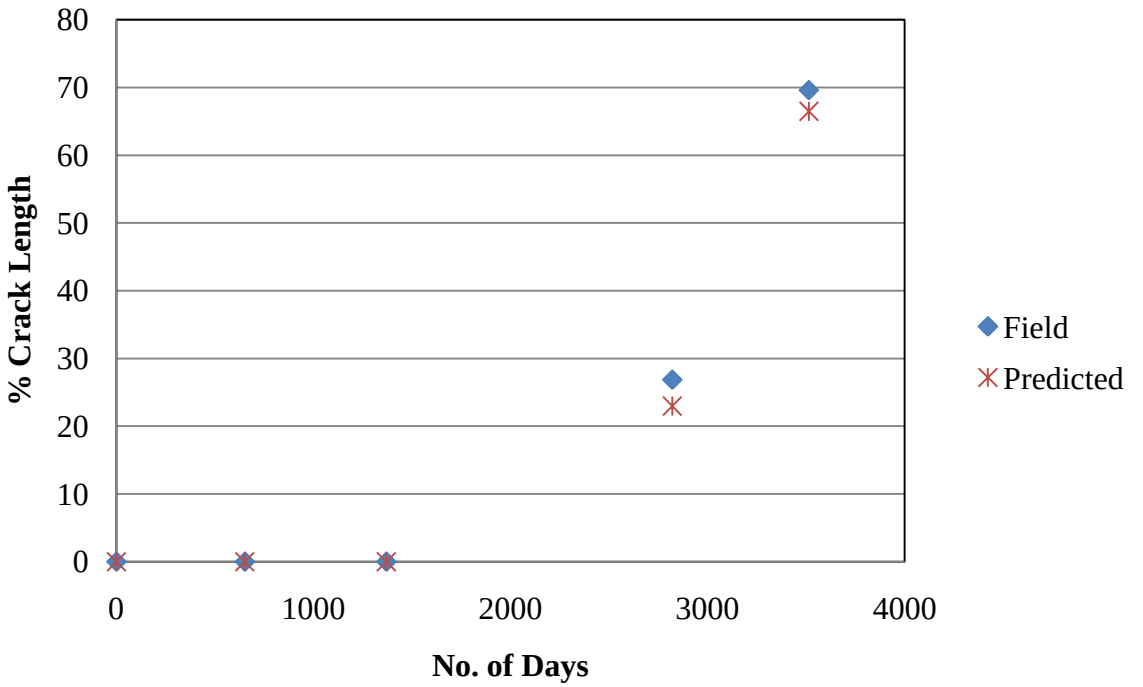

Figure T-1. The comparision between field and predicted results for LMH severity distress (AC over AC pavement structure, Wet-Freeze climate zone).

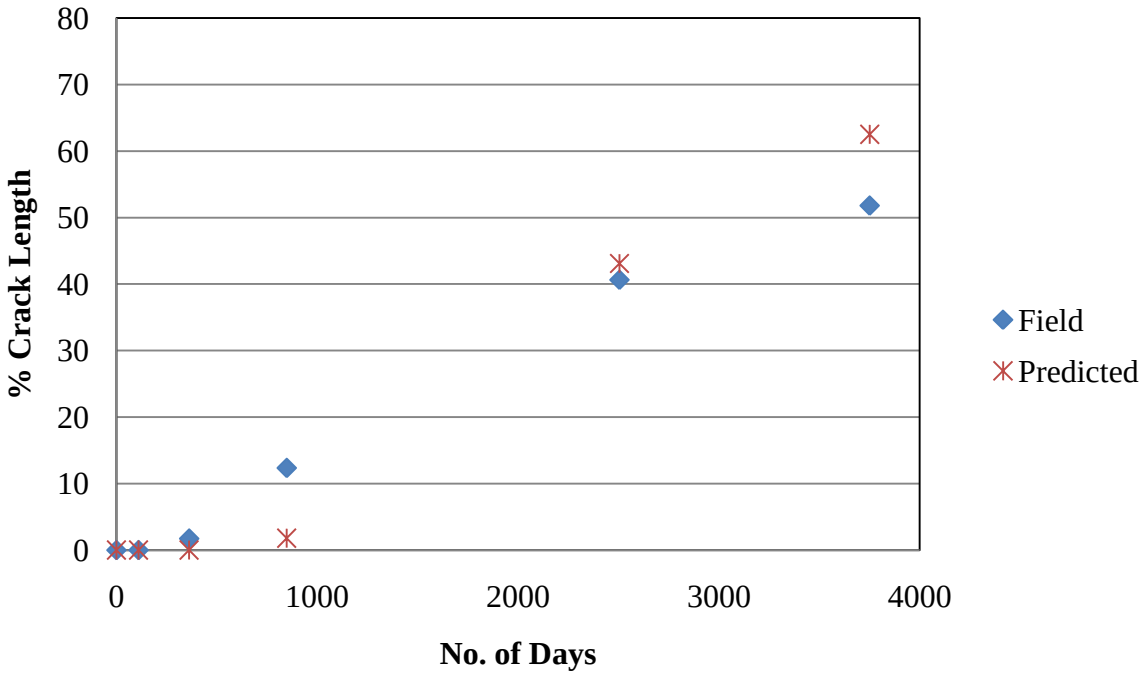

Figure T-2. The comparision between field and predicted results for LMH severity distress (AC over JPC pavement structure, Wet-Freeze climate zone).

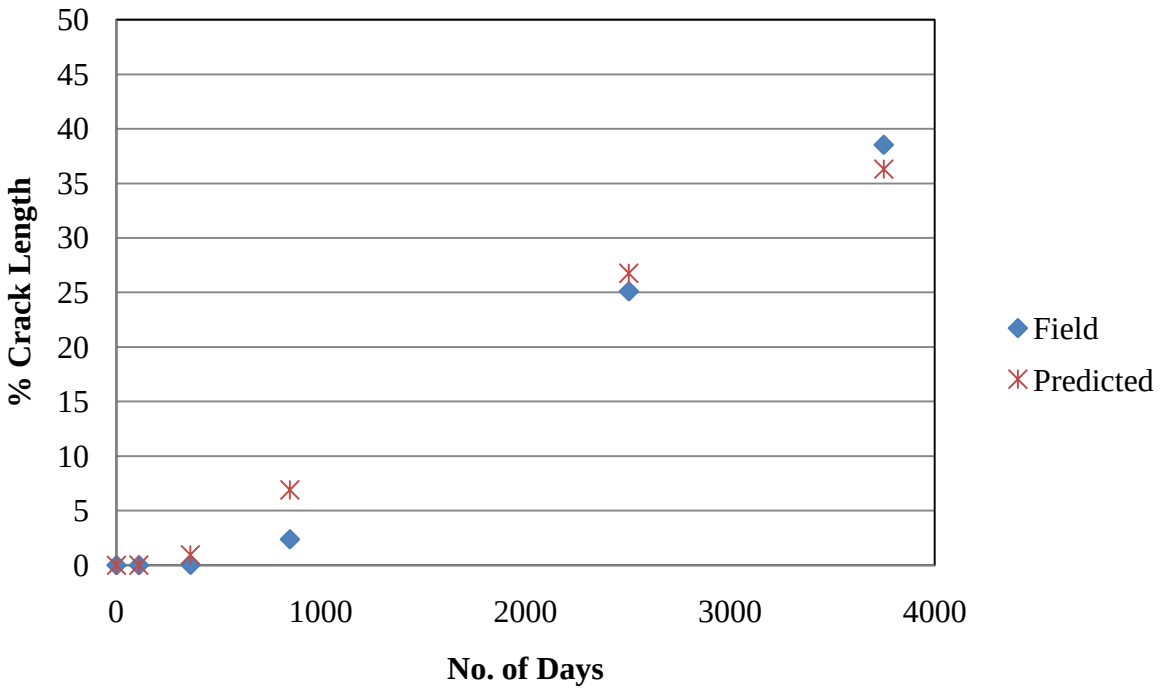

Figure T-3. The comparision between field and predicted results for MH severity distress (AC over JPC pavement structure, Wet-Freeze climate zone).

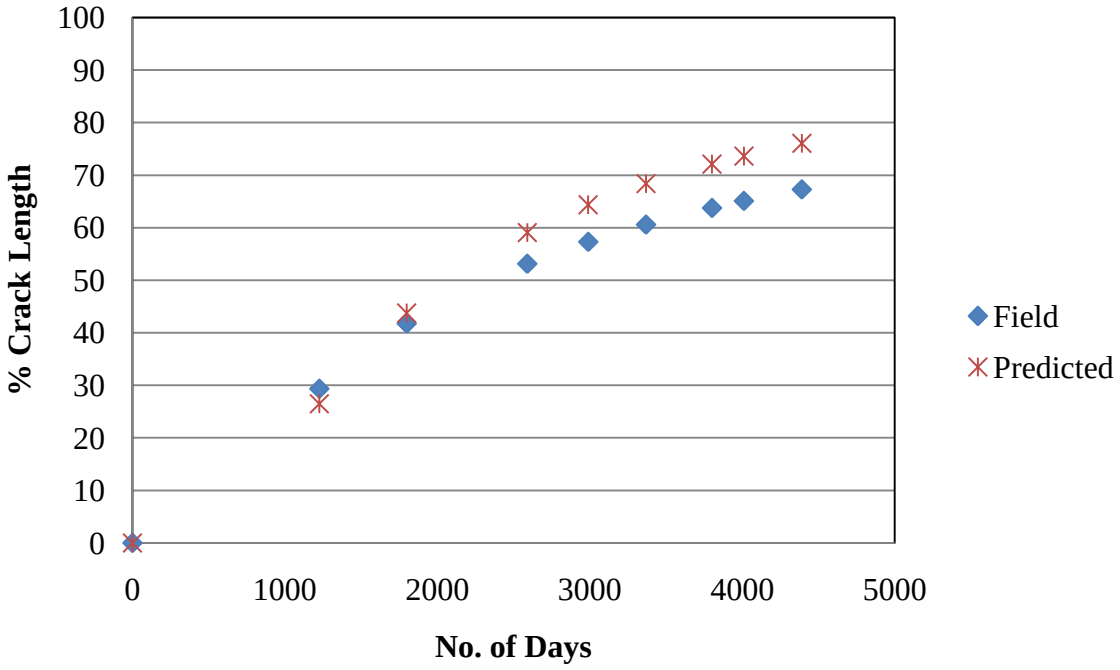

Figure T-4. The comparision between field and predicted results for LMH severity distress (AC over FC pavement structure, Wet-Freeze climate zone).

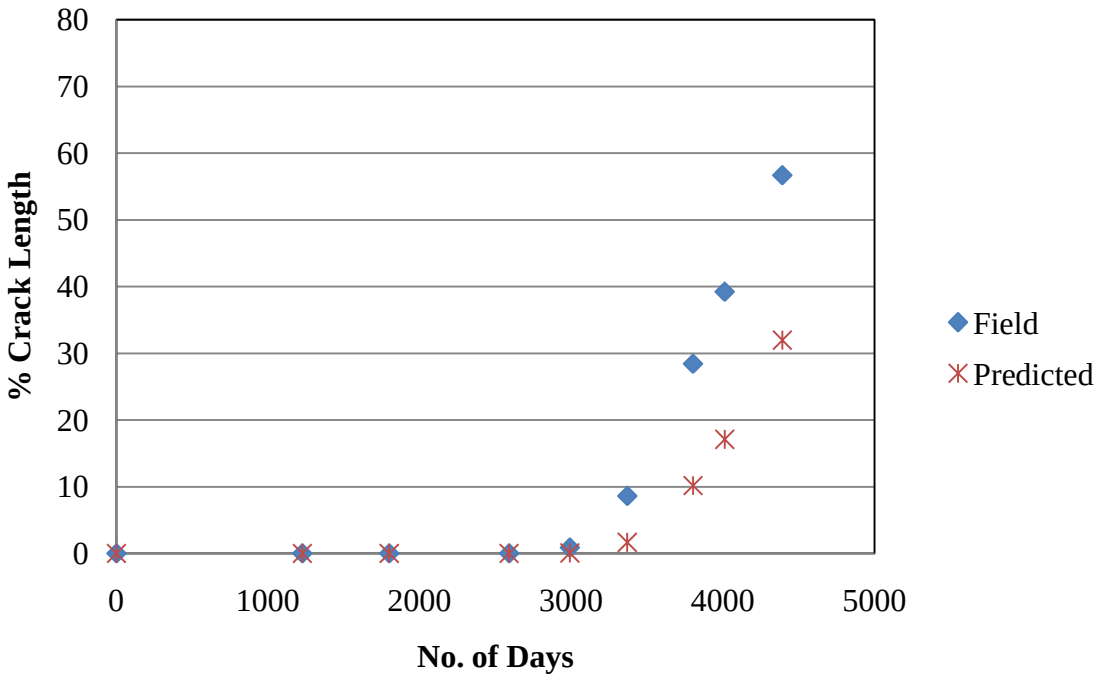

Figure T-5. The comparision between field and predicted results for MH severity distress (AC over FC pavement structure, Wet-Freeze climate zone).

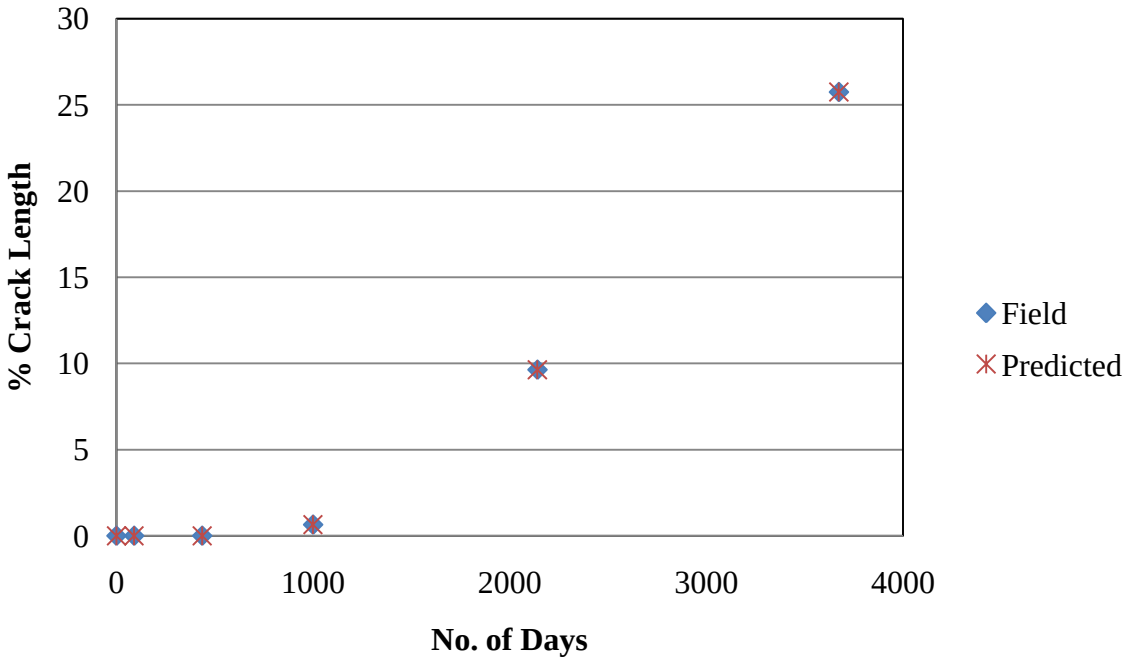

Figure T-6. The comparision between field and predicted results for LMH severity distress (AC over CRC pavement structure, Wet-Freeze climate zone).

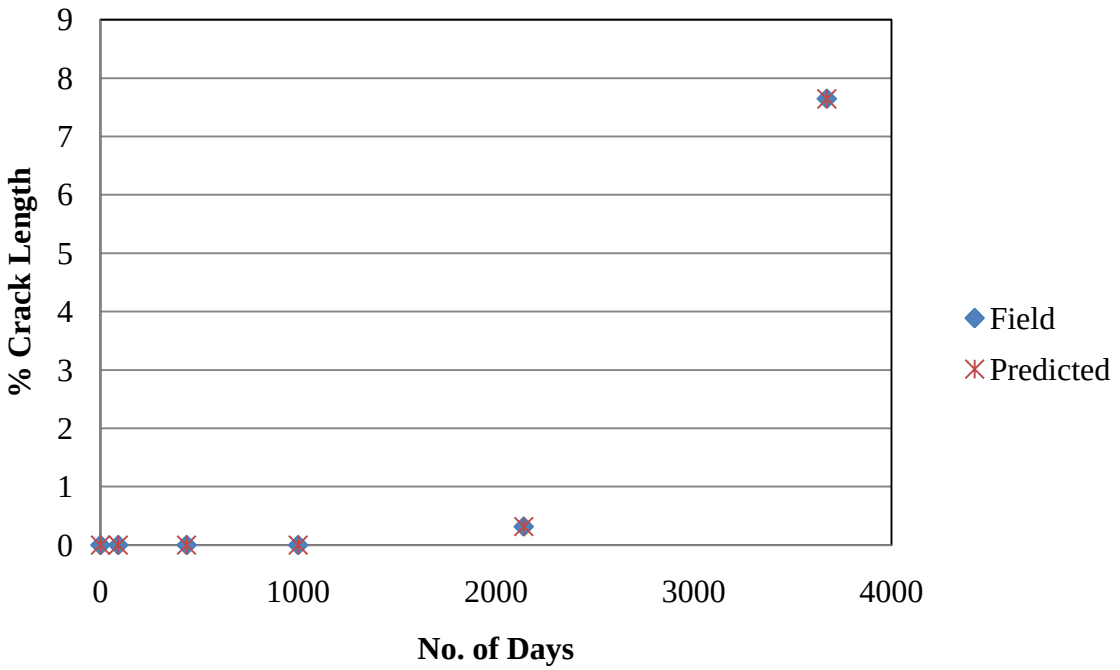

Figure T-7. The comparision between field and predicted results for MH severity distress (AC over CRC pavement structure, Wet-Freeze climate zone).

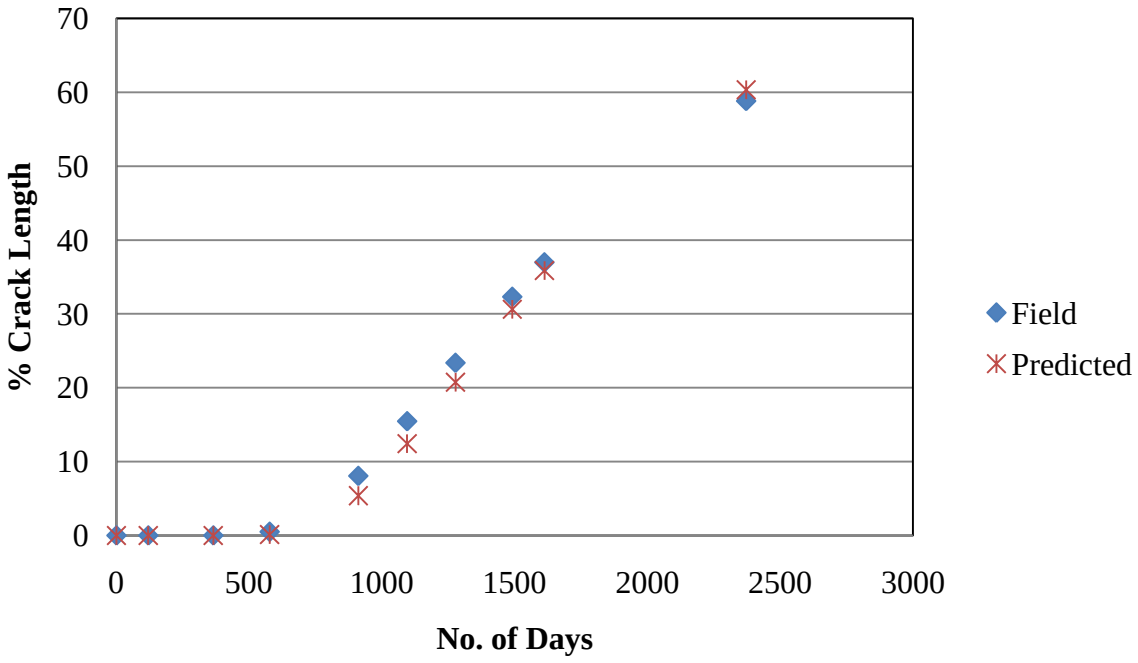

Figure T-8. The comparision between field and predicted results for LMH severity distress (AC over reinforcing interlayer over PCC pavement structure, Wet-Freeze climate zone).

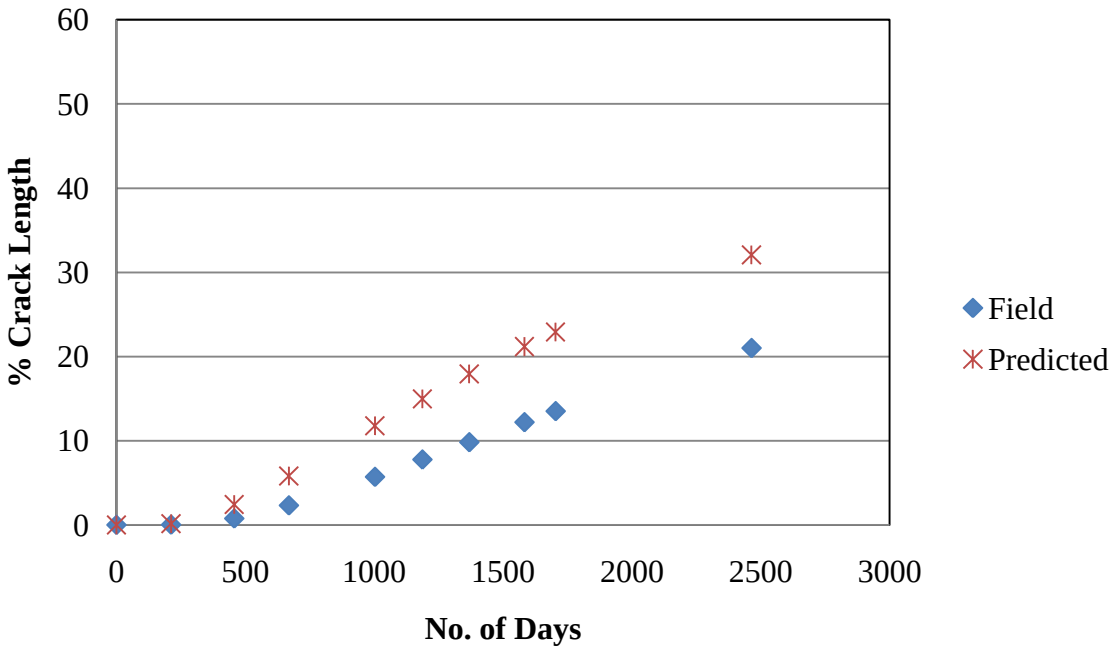

Figure T-9. The comparision between field and predicted results for MH severity distress (AC over reinforcing interlayer over PCC pavement structure, Wet-Freeze climate zone).

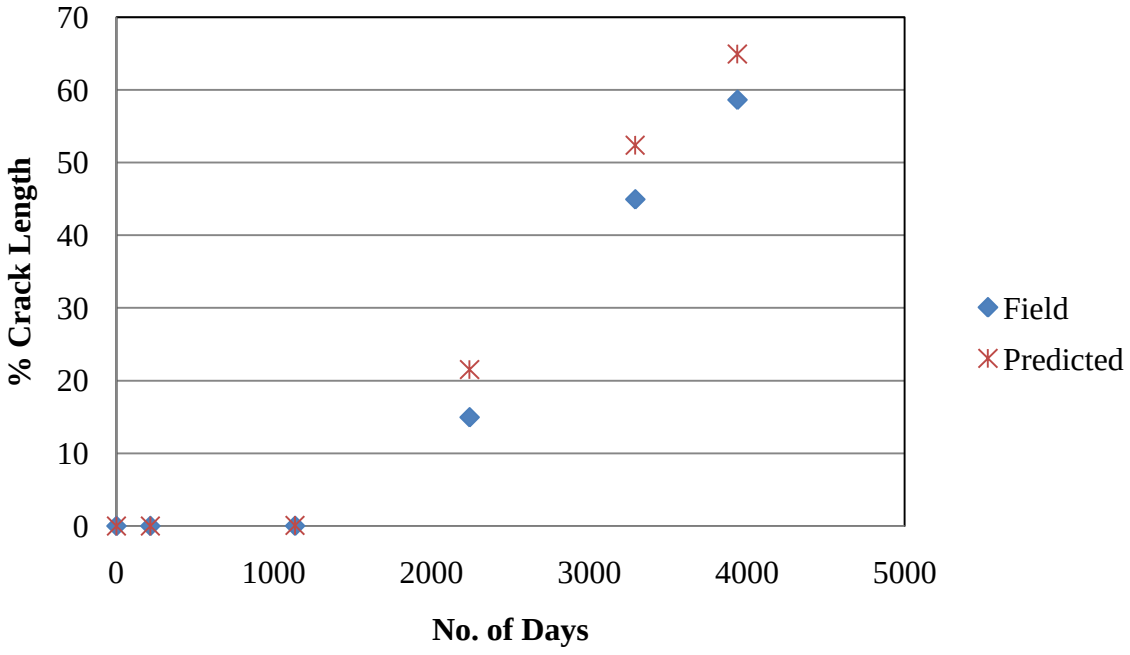

Figure T-10. The comparision between field and predicted results for LMH severity distress (AC over AC pavement structure, Wet-No Freeze climate zone).

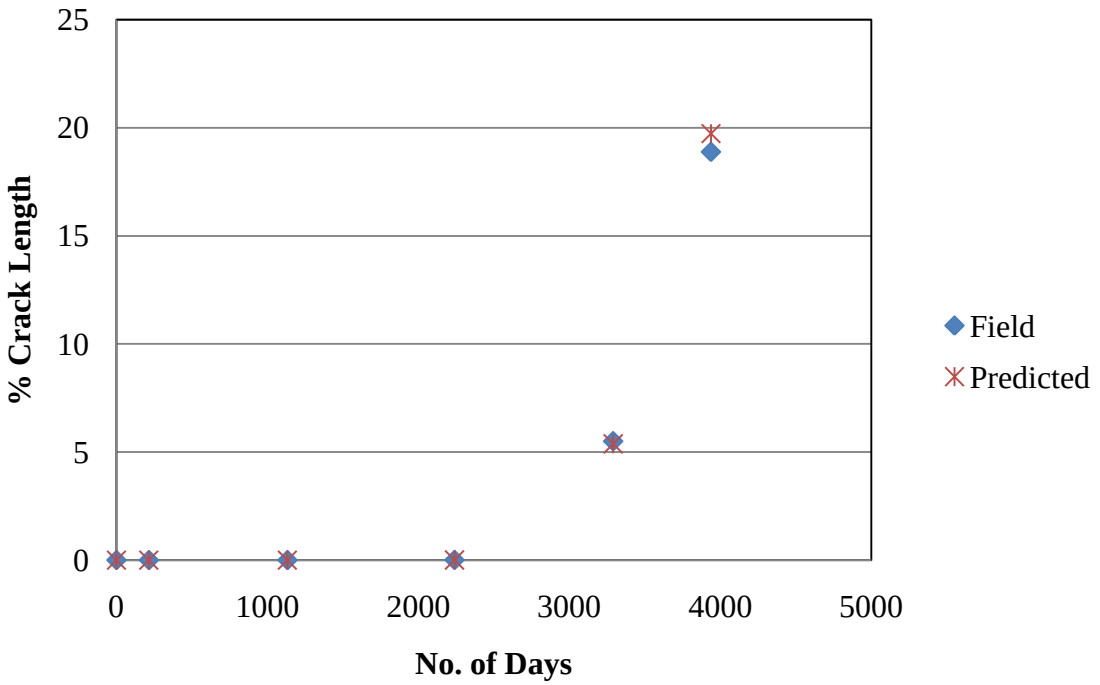

Figure T-11. The comparision between field and predicted results for MH severity distress (AC over AC pavement structure, Wet-No Freeze climate zone).

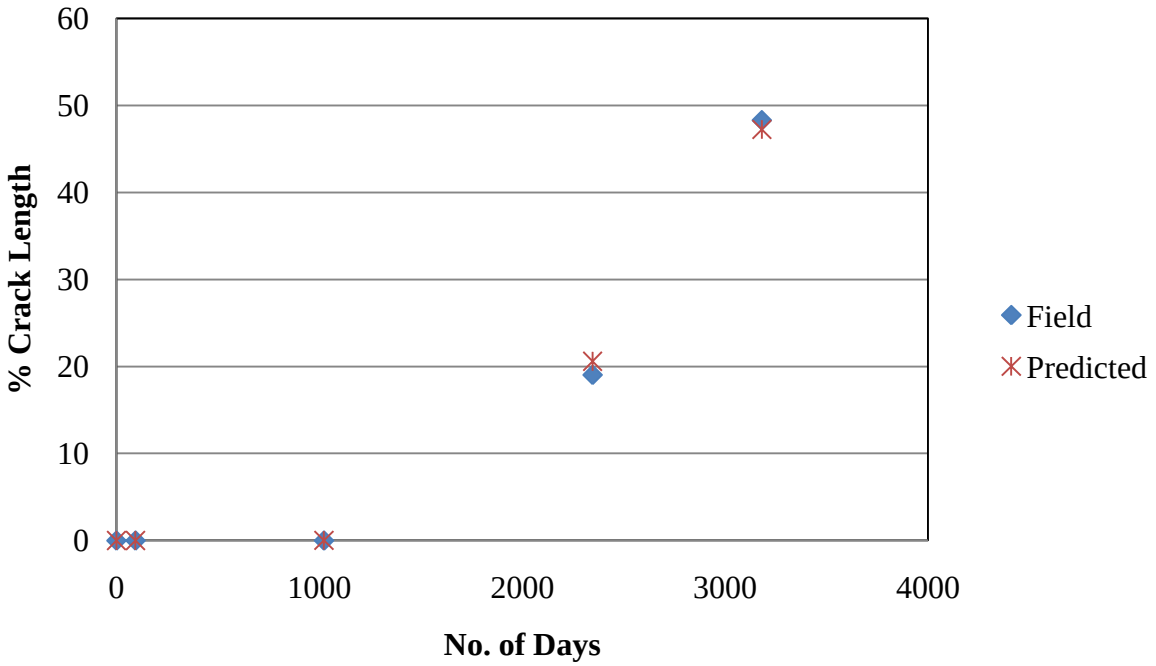

Figure T-12. The comparision between field and predicted results for LMH severity distress (AC over FC pavement structure, Wet-No Freeze climate zone).

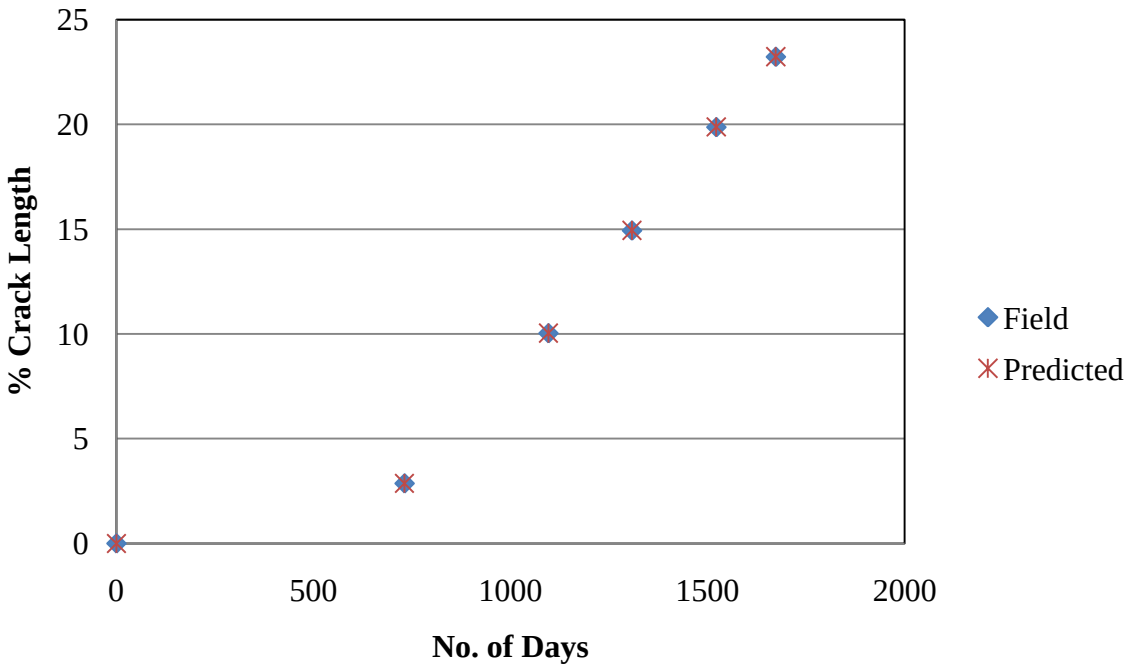

Figure T-13. The comparision between field and predicted results for LMH severity distress (AC over reinforcing interlayer over PCC pavement structure, Wet-No Freeze climate zone).

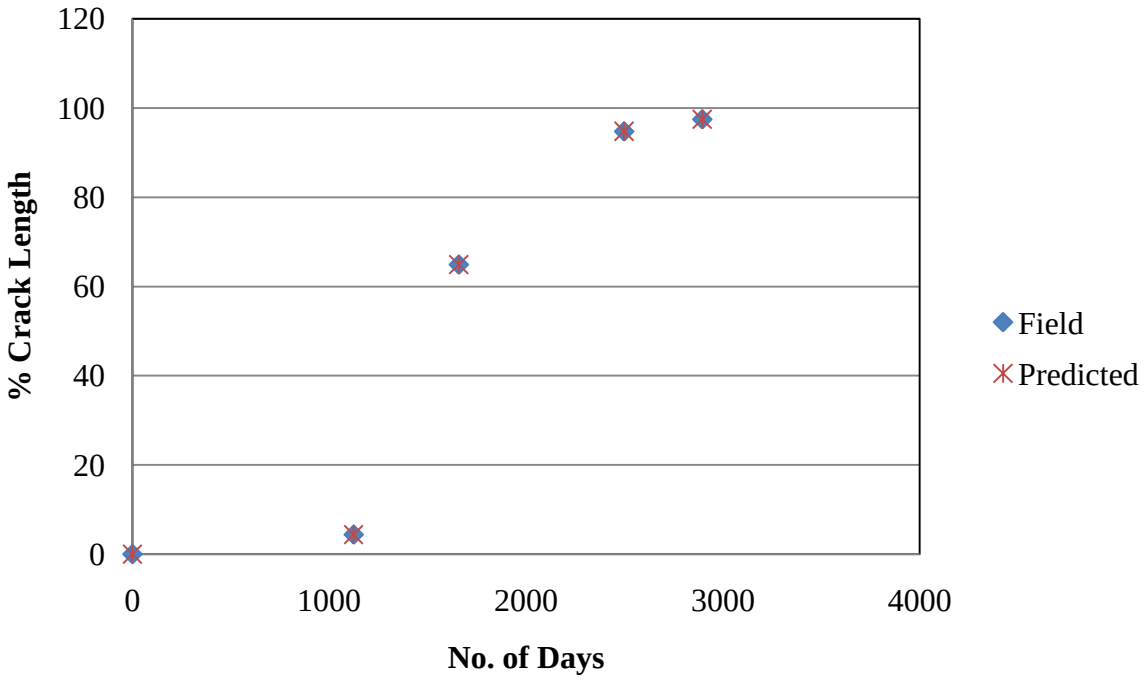

Figure T-14. The comparision between field and predicted results for LMH severity distress (AC over AC pavement structure, Dry-Freeze climate zone).

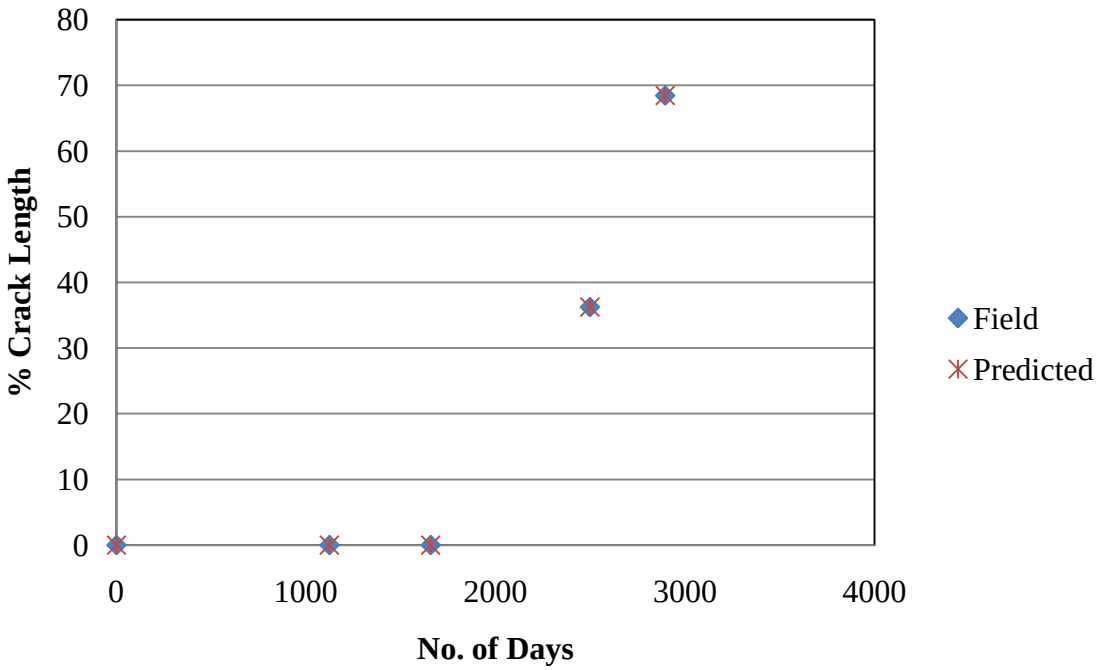

Figure T-15. The comparision between field and predicted results for MH severity distress (AC over AC pavement structure, Dry-Freeze climate zone).

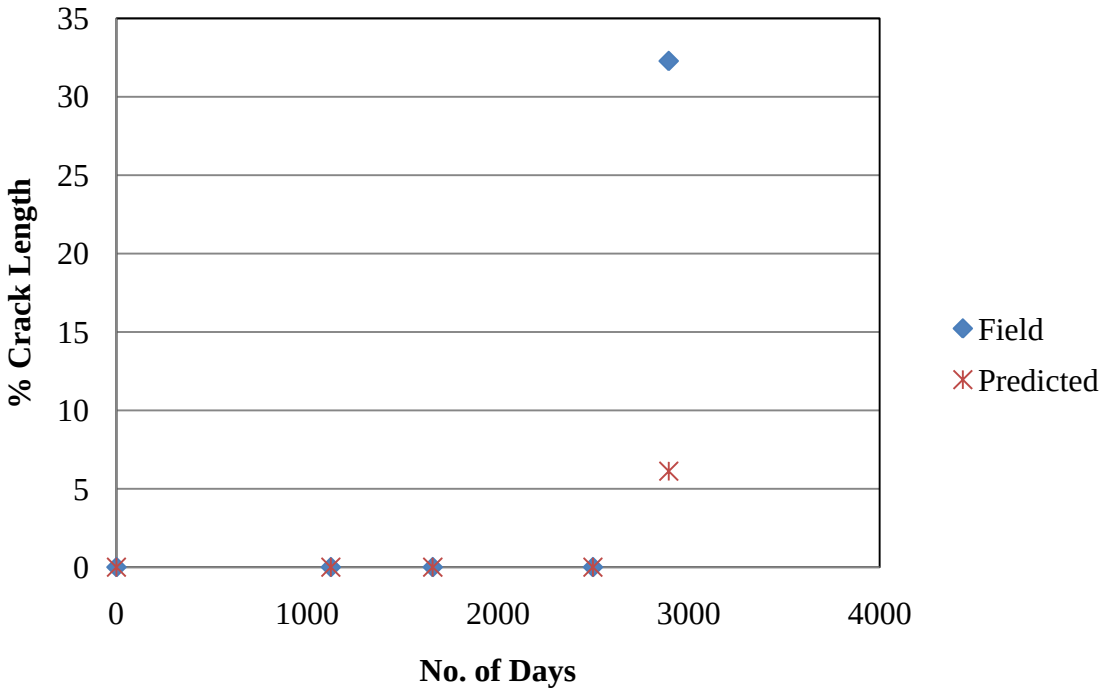

Figure T-16. The comparision between field and predicted results for H severity distress (AC over AC pavement structure, Dry-Freeze climate zone).

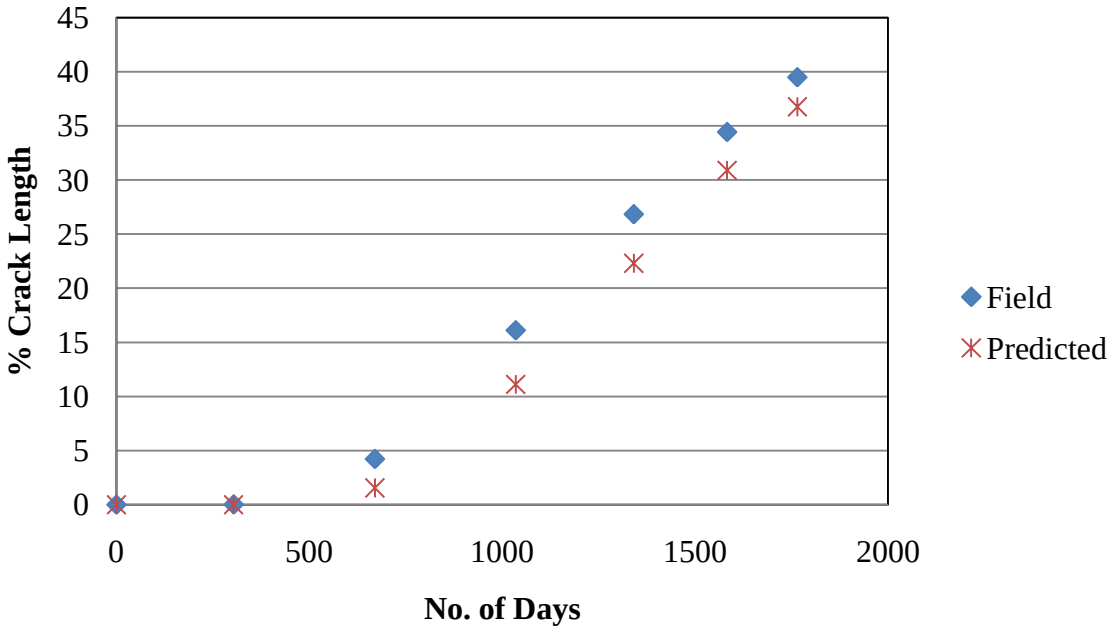

Figure T-17. The comparision between field and predicted results for LMH severity distress (AC over reinforcing interlayer over AC pavement structure, Dry-Freeze climate zone).

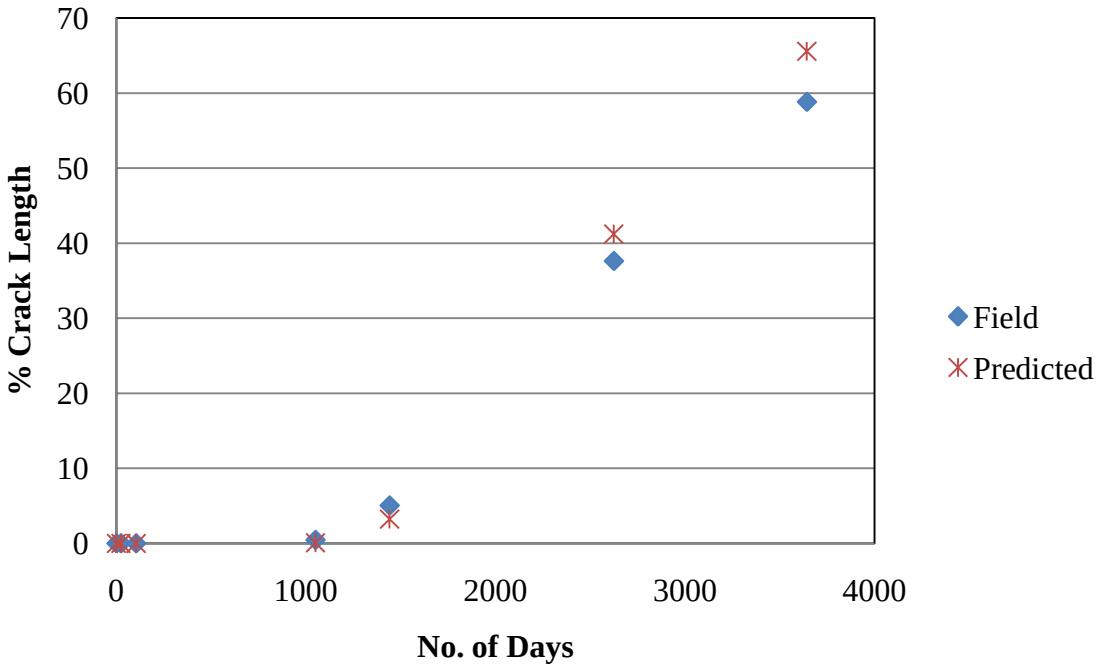

Figure T-18. The comparision between field and predicted results for LMH severity distress (AC over AC pavement structure, Dry-No Freeze climate zone).

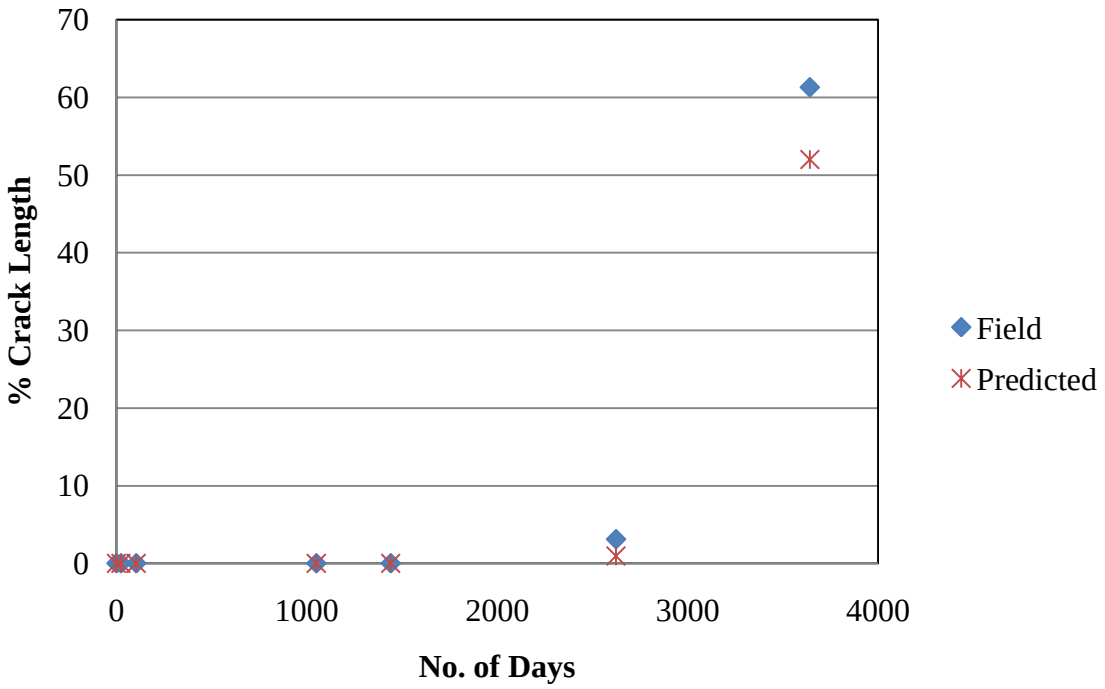

Figure T-19. The comparision between field and predicted results for MH severity distress (AC over AC pavement structure, Dry-No Freeze climate zone).